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AUTHOR Ysseldyke, James E.; And Others
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ABSTRACT

The study investigated alternative explanations for differences in mathematics achievement between pairs of handicapped students exhibiting comparable amounts of academic engaged time. Forty-two students in grades 2-4 from urban and suburban districts participated; 14 students were classified as learning disabled, 14 as emotionally or behaviorally disturbed, and 14 as educable mentally retarded. Explanations investigated were student demographics, cognitive functioning, home and family factors, teacher stress, student cognitions (including cognitive style), student motivation, behavior, and conditions in the learning environment. Of all factors investigated, only cognitive ability served as a consistent explanation for differences in math achievement for students matched on academic engaged time. Creating composite variables (specifically attitude modeling by significant others, stress/chaos in the child's environment, and home-school cooperation) was not helpful in explaining math achievement differences for the matched sample. It is suggested that diagnosticians concentrate on problem-solving for individual children rather than labeling children as LD, EBD, or EMR. (Author/JW)

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University of Minnesota

RESEARCH REPORT NO. 11

ALTERNATE EXPLANATIONS FOR LEARNING DISABLED, EMOTIONALLY DISTURBED, AND EDUCABLE MENTALLY RETARDED STUDENTS' MATH ACHIEVEMENT

James E. Ysseldyke, Maureen Cleary,
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INSTRUCTIONAL ALTERNATIVES PROJECT

August, 1988

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Abstract

Several alternate explanations for differences in math achievement between pairs of handicapped students who had comparable amounts of academic engaged time were explored. Forty-two students in grades 2-4 from urban and suburban districts participated; 14 students were classified as learning disabled (LD), 14 as emotionally/behaviorally disturbed (EBD), and 14 as educable mentally retarded (EMR). The explanations investigated were cognitive functioning, home and family factors, teachers' stress, student cognitions, student motivation, conditions in the learning environment, behavior, and student demographics. Three composite factors, stress and chaos in the child's life, degree of home-school cooperation, and parental attitudes and modeling, also were explored. Of all factors investigated, only cognitive ability served as a consistent explanation for differences in math achievement for students matched on academic engaged time. While other factors did not provide consistent explanations for differences among students in math achievement, regardless of categorical designation, several isolated, interesting factors did emerge. Implications for assessment practices are discussed.

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Alternate Explanations for Learning Disabled, Emotionally Disturbed, and Educable Mentally Retarded Students' Math Achievement

America's math problems are serious. They begin when our children are very young, persist throughout primary and secondary school, and are not limited to any particular aspect of mathematics (Stevenson, 1987). Results from large, cross-cultural studies (Stevenson, 1987; Stevenson, Lee, & Stigler, 1986) of the math achievement of American elementary school children compared to that of Japanese and Chinese students indicate that American children lag behind in math achievement as early as kindergarten. Their performance shows a consistent decline from kindergarten through fifth grade, in contrast to the consistently superior performance of Japanese children and the steady improvement in math achievement scores of Chinese students. The lower performance levels of American students is not attributed to differences in students' cognitive ability, but rather to factors in the student's learning environment, such as time allocated to mathematics instruction, opportunity, support for relevant practice, and parental values and beliefs regarding the importance of mathematics as an educational priority.

Outcome studies of math achievement of junior and senior high school students indicate that problems in the acquisition and application of mathematics skills are pervasive and persistent. For example, a recent report from the Second International Mathematics Study (McKnight, Crosswhite, Dosey, Kifer, Swafford, Travers, & Cooney, 1987) indicates that on tests given to students from 20 countries, American eighth-graders ranked tenth in arithmetic, twelfth in algebra, and sixteenth in geometry. When twelfth-grade students were compared to students from 14 countries, they ranked second from the bottom in their scores in algebra and were in the lower quartile in geometry.

Math scores on the College Board's Scholastic Aptitude Tests (SAT) demonstrate a decline in scores of nearly 40 points from 1963 to 1980. Findings from A Nation at Risk (National Commission on Excellence in Education, 1983) indicate that many 17 year olds do not possess the "higher order" intellectual skills needed to solve math problems requiring several steps. Between 1975 and 1980, the number of remedial mathematics courses in public, four-year colleges increased by 72%; they now constitute one-quarter of all mathematics courses taught in those insitutions. Given these data on the outcomes of mathematics instruction in our schools, educators are called to respond to the necessity of understanding the factors that determine math achievement.

Educators and psychologists have long been concerned about the relationship between academic engaged time and achievement. Several comprehensive reviews of research on time and its relationship to school learning have been written (Anderson, 1984; Graden, Tnurlow, & Ysseldyke, 1982; Karweit, 1983). In general, researchers have demonstrated: (a) there are school and teacher differences in time allocated to instruction; when aggregated over the school year, large differences between schools and classrooms in opportunity to learn in various curriculum areas result; (b) students spend a relatively small percentage of the school day actively engaged in academics; (c) the percentage of time engaged varies considerably across classrooms, resulting in large differences among students in time actively involved in learning; (d) engaged time rates depend on a variety of organizational factors (classroom management, class size, interruptions), content area, and the point in time during the instructional period; and (e) engaged time is consistently though moderately related to student achievement.

Time-based research is criticized on several counts. First, it is said tnat attention is drawn away from the quality of learning and toward the quantity of time spent learning. Confrey (1981) argued that what occurs during a time period, not simply accumulation of time, is most critical for student learning. Thus, assignment of "busywork" can result in high time-on-task rates for a student without concomitant increases in learning. Karweit (1983) criticized time research because: (a) time appears to be at most a moderate predictor of achievement, (b) teacher, student, and classroom variation in engaged time may not be as easily altered as suggested by Bloom (1980), and (c) large increases in instructional time may be required for relatively small changes in achievement. In her review and re-analysis of studies of engaged time and achievement, Karweit concluded that there is a consistent, but low, positive correlation (r=.09-.43) between the two when initial ability is controlled.

In time research there is also a failure to account for a wide variety of student and environmental factors, in and out of the school, that have been shown to influence learning. These factors may serve as explanations for the differing achievement levels often obtained by students demonstrating comparable amounts of academic engaged time. In explanations for this discrepancy, researchers frequently focus upon variables relating to motivation, social adjustment, cognition, behavior ratings, teacher stress, home and family characteristics and other conditions that place the student at risk for academic failure. These variables have been primarily examined in studies using correlational and factor analytic designs.

Several investigators have examined how motivation has affected academic achievement (Byrne, 1984; Dweck & Elliott, 1983; Gottfried, 1985). While the domain encompassed by motivation is broad and is defined differently in different studies, researchers generally conclude that motivation exerts a profound influence upon academic performance and achievement.

Social/emotional factors such as anxiety (Dweck & Elliott, 1983; Patten, 1983), attitudes and expectancies (Byrne, 1984; Rogers & Saklofske, 1985), personality and temperament (Rutter, 1980; Schor, 1985; Sharma, 1985), and social skills and activities (Deschler, Schumaker, Warner, Alley, & Clark, 1980; Gresham, Elliott, & Black, 1987; Stumme, Gresham, & Scott, 1983) have been found to be related to academic achievement, but results frequently are conflicting due to different operational definitions of constructs, characteristics of the subject pool, and measurement methodologies (e.g., Achenbach & Edelbrock, 1978).

The relationship between cognitive processing and academic achievement has been well documented (Bloom, 1976; Froman, & Owen, 1977; Grossman, & Clark, 1982; Wong, 1986). Given that academic tasks are cognitive in nature, IQ and cognitive entry behaviors are thought to constitute a necessary but not sufficient condition for the achievement of learning tasks.

Classroom behavioral ratings have been shown to predict academic achievement independent of IQ (McKinney & Feagans, 1983, 1984; McKinney & Speece, 1983; Schaefer, 1981). Behavioral patterns that impair academic achievement have been documented for LD students (McKinney & Feagans, 1983, 1984; McKinney & Speece, 1983). Teachers have described LD students as less task oriented and independent in comparison with classmates, and have indicated that they display less on-task behavior and demand more interaction with the teacher. McKinney and Feagans (1983) stated:

> Although learning disabilities (LD) are usually defined in terms of deficits in cognitive and linguistic processes, evidence has accumulated that LD children also display maladaptive behaviors which impair their academic performance and lead to their identification as requiring special services (p. 360)

The behavioral pattern appears to already exist at the time of LD identification. It has been reported that observation shows that behavior improves over time at a rate similar to the improvement in non-LD children's behavior (McKinney & Feagans, 1984).

Preliminary research has been conducted in the area of teacher stress. It appears that degree of teacher stress has a significant effect upon student achievement by influencing students' attitudes, aspirations, and learning environments (Coleman, 1966; Glasman & Biniaminov, 1981).

Home background has been shown to strongly influence school achievement, particularly in studies using global social status and family structure measures (Coleman, 1966; Mosteller & Moynihan, 1972). More specific home and family variables positively related to academic achievement include homework (Goldstein, 1960; Walberg, Paschal, & Weinstein, 1985), parental expectations for academic performance (Bocock, 1972; Keeves, 1972; Peaker, 1967), and parental involvement with the school and their child's education (Epstein, 1984; Hewison & Tizard, 1980), However, the strength of the relationships for these factors varies considerably throughout the research. The relationship between television viewing time and academic achievement has been studied extensively. Discrepant findings result in equivocal conclusions (Neuman, 1986; Williams, Haertel, Haertel, & Walberg, 1982).

Samuels (1986) described conditions in a child's learning environment that place the child at risk for academic failure. These conditions include

cnaracteristics of the home, such as degree of support for school efforts and tne moral standards and values fostered in the home; characteristics of the school environment, such as the strength of administrative leadership and the degree of task orientation within the classroom; characteristics of the wider community, such as degree of support for school efforts; and motivational and attitudinal characteristics of students.

These student and environmental factors have been examined with regard to tneir impact on students' acquisition of reading skills (Ysseldyke, Bakewell, Christenson, Muyskens, Shriner, Cleary, & Weiss, 1988). Although reading is conceived of as the most important skill taught in school and is the primary academic referral concern for students, many students are referred for remedial instruction and special education due to problems in the acquisition and application of mathematics skills.

In this study, factors that have been found to be empirically related to student achievement are examined with specific reference to the math achievement of mildly handicapped students (LD, EMR, EBD) who show comparable amounts of academic engaged time. The purpose of this descriptive study was to consider several alternative explanations for math achievement differences among students who have had comparable amounts of academic engaged time, and to determine whether those factors vary among different categories of mildly handicapped students (LD, EBD, EMR). The research questions addressed were:

1. To what extent are the differences in math achievement for mildly handicapped students influenced by:
    - home and family factors
    - teacner stress

- ° cognitive functioning
- ° student cognitions
- ° student motivation
- ° conditions in the learning environment
- ° behavior

2. To what extent are differences in math achievement for mildly handicapped students influenced by:
   - ° stress or chaos in the child's life
   - ° degree of home-school cooperation
   - ° parental attitudes and modeling
3. Are there differences in factors that influence math achievement for LD, EBD, and EMR students?

Method

Subjects

Subjects were 42 students from grades 2-4 in 17 schools in one urban and one suburban school district. The subjects formed 21 pairs in which the two students had approximately equivalent academic engaged times, but discrepant levels of math achievement. During the first year of an ongoing project, academic engaged time data and achievement data were collected on 122 students. Tne CISSAR system, developed by Greenwood, Delquadri, and Hall (1978), was used to collect data on academic engaged time (AET). The CISSAR system is a momentary time sampling technique. Students were observed for one school day. Students' math achievement was measured on the Basic Achievement Skills Individual Screener (BASIS) (The Psychological Corporation, 1983). A student

was considered to be a potential subject for this post hoc matching study if the following criteria were met: (a) AET was comparable to the AET of another student within the same grade and handicapping condition (comparable engaged time was defined as within 1 standard deviation), and (b) math achievement score was significantly different at the .05 level from the score of the same other student. Sixty-six handicapped students (22 LD, 24 EBD, 20 EMR) were potential subjects using these criteria. Mean AET for potential matched pairs varied by less tnan 11 minutes per day across all handicapping conditions (average variability = 10.9 min per day; range = 10.2 - 11.3). Potential LD matched pairs' math achievement differed by 6.3 grades, EBD matched pairs by 6.3 grades, and EMR matched pairs by 3.2 grades. Several of the 66 students were unable to participate in the study due to parent refusal or the requirement that a student could not be in more than one pairing. The final sample included 42 students (14 LD, 14 EBD, 14 EMR).

Demographic data for all subjects are presented by category in Table 1. The mean age for all subjects was 119 months; the range was 98-139 months. EMR students were slightly older than LD and EBD students. The EBD group had a higher percentage of males than the other two groups. For all groups, more than half of the students were non-minority, with the LD group having the highest percentage of non-minority students. Students in the "Other" category were of undetermined minority race/ethnicity. Other than the absence of LD students in grade 3, the total number of students in each grade was fairly consistent across the handicapping conditions.

The 42 students were taught by 20 regular education and 26 special education teachers. Most teachers were female (91.3%); only 4 teachers (8.7%)

Table 1

Subject Demographic Data for Independent Matched Pairs[a]

Demographic Data	Category LD N = 14	EBD N = 14	EMR N = 14	TOTAL GROUP N = 42
Age in months				
$\bar{M}$	117.8	117.6	126.6	119.0
Range	98-138	103-132	107-139	98-139
Sex				
Female	7	3	9	19
Male	7	11	5	23
Race				
Black	3	4	4	11
Asian	0	0	1	1
White	11	9	8	28
Native American	0	0	1	1
Other	0	1	0	1
Grade				
2	4	2	3	9
3	0	2	1	3
4	3	3	3	9

[a]Numbers in cells denote numbers of students, with the exception of months for age.

were male. Their mean number of years of teaching was 16.3 (range = 1-35). Most teachers held a bachelor's degree plus additional credits (43.5%) or a master's degree plus additional credits (28.3%); 10.9% held a bachelor's degree, 15.2% held a master's degree, and one teacher had a Ph.D. Seven special education teachers held a single licensure (LD, EBD, EMR); the remaining teachers were certified in two special education areas.

Demographic data for families are presented in Table 2. Most LD children lived with both parents, whereas most EBD students lived with their mothers. Approximately half of the EMR students lived with their mother and half with both parents. The majority of children in all groups had 1 to 2 siblings. Families of LD children tended to be somewhat larger than families of EBD or EMR students. Very few subjects lived with other children in addition to their siblings. Most of the parents in the sample had finished high school and had obtained either technical or university training; relatively few parents had attained university degrees. Mothers in this sample tended to be better educated than fathers; however, the educational level of fathers of 17 students was unknown.

Measures

We examined the extent to which several factors were related to differences in math achievement among the matched pairs: home and family factors, teacher stress, cognitive, student cognitions, student motivation, conditions in the learning environment, and student behavior.

Home factors. A semi-structured home interview, which was a modification of interviews developed by Marjoribanks (1979), Egeland (personal communication, 1985) and Garmezy (personal communication, 1985), was used to obtain information

Table 2

Family Demographic Data By Category[a]

	Category					
	LD		EBD		EMR	
Parent(s) child lives with						
Mother only	3		9		5	
Father only	--		--		0	
Both parents	11		3		7	
Adults in household						
1 adult	2		8		4	
2 adults	12		4		8	
4 adults	--		1		--	
5 adults	--		--		1	
Missing data	--		1		1	
Siblings						
0 sibs	1		3		3	
1 sib	4		7		8	
2 sibs	3		2		--	
3 sibs	4		1		1	
4 sibs	2		--		1	
Missing data	--		1		1	
Otner children in household:						
0	14		12		11	
2	--		--		1	
3	--		1		1	
Missing data	--		1		1	
Education level of parents[b]	M	F	M	F	M	F
Less than elementary	-	-	-	-	1	1
Some high school	1	1	1	1	5	1
Finished high school	3	2	5	1	2	2
Technical training	-	4	1	1	3	2
Some university	7	3	3	2	2	3
University degree	3	1	2	-	-	-
Higher degree	-	-	1	-	-	-
Unknown	-	3	1	9	1	5

[a]Numbers in cells denote number of students.
[b]M = mother, F = fatner

about the child's living situation, weekly routine/use of out-of-school time, homework practices, the family's attitudes toward the child's education, and the nature and extent of stressful events in the family. Ratings were obtained on the degree to which the child's home was characterized by established routine, lack of stress, security, opportunity to develop responsibility, realistic expectations for the child's education and academic success, valuing of education, assistance and support for completion of academic work, organization, and parental support for school efforts. Additional ratings of the child's use of out-of-school time included the degree to which: (a) the parent(s) provided direction for out-of-school time, (b) the child was involved in productive activities, (c) the child watched television, and (d) the child read in the home. All but two of the items were rated on a 4-point Likert-type scale, with "1" indicating "not at all like the child's home environment" and "4" indicating "very much like the child's home environment." The exceptions were that amount of TV watching and reading done out of school were rated in three categories: a lot, average, or a little, based on the mean and standard deviation for the entire sample.

Teacher stress/hassle. An open-ended, 7-item interview was developed to obtain information about the amount of stress experienced by the teacher for teaching both handicapped and nonhandicapped students. Teachers were asked the advantages and disadvantages of teaching in general, and of teaching at their current school, in particular. The interview also asked questions about school administrative leadership and the degree to which the parents were supportive of teacher efforts and recommendations.

Cognitive. The cognitive factor included verbal, performance, and full scale IQs from the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974).

Student cognitions. The Student Cognitions Questionnaire, a modification of a self-report Cognitive Processing Questionnaire (Peterson, Swing, Stark, & Waas, 1984), was used to measure students' active thinking process during instruction. The questionnaire includes 21 items grouped into five subscales: Poor Listening, Positive Listening, Cautious Style, Active Thinker, and Understanding.

Student motivation. Student motivation was measured using A Scale of Intrinsic versus Extrinsic Orientation in the Classroom (Harter, 1980). This self-report measure consisted of 30 items grouped into five subscales: Challenge, Curiosity, Mastery, Judgment and Criteria. It was designed to measure students' intrinsic-extrinsic orientation to classroom tasks and their ability to make judgments about their performance. A higher score on each subscale indicates an intrinsic orientation toward motivation in the classroom.

Conditions in the learning environment. Based on Samuels' (1986) description of conditions ripe for student failure, 10 statements were developed. The statements specified important conditions that, when they exist in the home, school (via teachers and principals), and community, create a total learning environment. Each of the items was rated by interviewers on a 4-point Likert-type scale with "1" indicating that the item was "not at all like the child's learning environment" and "4" indicating that the item was "very much like the child's learning environment." These 10 items, which appear in Appendix A, are referred to as the Conditions in the Learning Environment Scale (CLES).

Behavior. Information on students' behavior was collected using the Behavior Rating Profile (BRP) (Brown & Hammill, 1978). The BRP is a prepared list of 30 statements that regular and special education teachers, parents, and students rate as being like or not like a particular student.

Procedures

Parent permission. During the project's first year, parent permission for observation and achievement testing was obtained for students randomly selected from grades 2-4 in the participating schools. In the fall of the second year, after the list of all subjects who met the criteria for matching was generated, parents were sent a letter and permission form to cover the collection of additional information. Obtaining signed parent permission the second time was a time consuming task. In some cases, it was an impossible task. Of the 66 handicapped students identified as potential subjects for the matching study, parent permission was obtained via mail for 26 students (10 LD, 7 EBD, 9 EMR); parent permission was obtained after follow-up telephone calls for 32 students (10 LD, 12 EBD, 10 EMR); parent permission was not obtained despite significant follow-up for 3 students (EBD), and 5 parents were unwilling to have their child participate (2 LD, 2 EBD, 1 EMR).

Training and data collection procedures. Data collection began with the collection of CISSAR observational data and BASIS achievement data. Observations and achievement testing were conducted on 122 students as part of a larger ongoing study. Data collection then proceeded to administration of the WISC-R, A Scale of Intrinsic versus Extrinsic Orientation, the Behavior Rating Profile, and the Student Cognitions Questionnaire. These were followed by home interviews and then teacher interviews.

Data were collected primarily by advanced graduate students, with assistance from the other data collectors on the observational and self-report social-emotional questionnaires (Behavior Rating Profile, A Scale of Intrinsic versus Extrinsic Orientation, Student Cognitions Questionnaire). These measures were administered in the school setting, with the exception of two cases, in which tests were administered in the students' homes.

Advanced graduate students completed the home interviews; all interviews were conducted in the students' homes and lasted approximately one hour. Parents were paid $15.00 for participation in the interview.

Training for the home interviews was done in pairs, beginning with the two individuals who had developed the semi-structured interview. The trainer conducted the home interview while a trainee observed; ratings were completed and compared after the home interview. The trainee conducted a second home interview while the trainer observed and ratings were compared. Training continued until both members of the pair were confident that the trainee was ready to interview independently and inter-rater agreement met a minimal predetermined standard. Home ratings were on a 4-point Likert-type scale, with "1" indicating "not at all like the child's home environment" and "4" indicating "very much like the child's home environment." Inter-rater agreement was calculated in two ways: Grouped and Exact. For grouped agreement, ratings of 1 and 2 were combined and ratings of 3 and 4 were combined. The minimal predetermined standard of agreement between the two interviewers was 7 out of 9 items or 78%. Exact agreement occurred when both interviewers coded the exact same rating on the 4-point scale; agreement had to reach a minimal standard of 56% (i.e., 5 out of 9 items). After trainees were competent interviewers, they

trained other interviewers. Inter-rater agreement was checked 14 times during the study on 7 pairs of interviews. Average inter-rater agreement for grouped items was 91.3%; exact agreement was 70.6%.

Graduate students interviewed both regular and special education teachers for the LD and EBD students served in resource rooms, and only the special education teacher for EMR students served in self-contained classrooms. In general, the teacher interview lasted 20 minutes. The interviewer recorded the teacher's response to seven open-ended questions. In addition, teachers were asked to rate the degree of stress they experienced in teaching in general and in teaching handicapped students; ratings were on a five-point Likert scale, where "1" indicated "not at all stressful" and "5" indicated "extremely stressful."

The Conditions in the Learning Environment Scale was completed by individuals conducting home interviews, teacher interviews, social-emotional measures, and principal interviews. All items rated are listed in Appendix A. After completing social-emotional testing, interviewers rated items 3, 7 and 10. Home interviewers rated items 1, 4, 5 and 7. Items 6, 7, 8 and 9 were rated after interviews with regular and special education teachers, and item 2 was rated after the principal interview. Multiple sources of information were available for items 6, 7, 8 and 9.

Data collectors rated the appropriate statement on a four point Likert-type scale, with "1" indicating "not at all like the child's learning environment" and "4" indicating "very much like the child's learning environment." No specific training was provided for this rating. The data collectors rated the degree to which they thought the statement applied to the child's learning environment.

Data Analysis

The purpose of this study was to describe how various factors related to academic success explain differences in math achievement for mildly handicapped students who were matched on academic engaged time. Differences among categories of students (LD, EBD, EMR) in these factors also were investigated. In order to explain differences in math achievement for the 21 matched pairs (7 LD, 7 EBD, 7 EMR) showing comparable amounts of engaged time, two levels of analyses were conducted.

In the first level of analysis, the status of higher and lower achieving students (within grade and category of handicapping condition) was compared on various individual factors to determine their relevance as explanations for achievement differences. Subjects within each pair were compared in terms of their performance on each of eight measures: student demographic information, the WISC-R, A Scale of Intrinsic versus Extrinsic Motivation, the Behavior Rating Profile, Student Cognitions Questionnaire, Conditions in the Learning Environment, ratings of teacher stress, and home and family factors.

For the next level of analysis, second-order factors were created by aggregating specific items from the first-order factors (i.e., home and family variables, teacher stress, conditions in the learning environment). Three second-order factors were created: generalized stress/chaos within the child's environment, home-school cooperation, and attitude/modeling by significant others in the child's life.

Nonparametric statistical procedures were used to test for achievement differences in categorical data. The degree of independence of each factor and achievement for pairs of LD, EBD, and EMR students and for the total sample of

handicapped students was assessed using chi-square analyses. Because of the small number of independent matched pairs within each of the handicapping conditions, cell frequency rules of the chi-square test were sometimes violated and Fisher's Exact Test was applied. A .05 alpha was adopted for these analyses.

The small sample size precluded the use of parametric procedures (e.g., ANOVA). Because of this limitation and because the purpose of this study was to provide in-depth description of factors important in differentiating math achievement for students matched on academic engaged time, a case study methodology was used. The standard deviation, or Z-score, information from the WISC-R, A Scale of Intrinsic versus Extrinsic Orientation, and Behavior Rating Profile was used as the criterion to describe a difference between paired students. Thus, a 15-point discrepancy was used on verbal, performance and full scales of the WISC-R. The standard deviation for each subscale on A Scale of Intrinsic versus Extrinsic Orientation was: Challenge = .63, Curiosity = .77, Mastery = .62, Judgment = .45, and Criteria = .67. The standard deviation of the Behavior Rating Profile, which was three points, was applied to the standard score for each student in the pair to indicate a difference in behavioral rating.

A difference between the pairs of students was determined by a decision rule for the Student Cognitions Scale and the Conditions in the Learning Environment Scale. For each scale, the numbers of pairs in which there was a directional difference (positive ratings vs negative ratings) were calculated. Each item on the Student Cognitions Scale was answered on a 4-point scale (1 = rarely, 2 = sometimes, 3 = often, and 4 = almost always). Means were computed

for each of the five subscales and means of 1 and 2 were grouped to indicate a low value on a subscale, while means of 3 and 4 were grouped together to indicate a high value. The higher and lower achieving students were considered different if one student scored in the low value range and the other in the high value range on a subscale. Data were missing for some students on many subscales of the Student Cognitions Questionnaire, due to the fact that students answered "don't know" to several items within a scale. These data were dropped out of the analysis; matched pairs were compared on a subscale only if both students had complete data. For the Conditions in the Learning Environment Scale, a mean of the 10 statements was computed. Students within pairs were compared on whether the mean rating of the learning environment was generally positive (i.e., 3 or 4) or negative (i.e., 1 or 2).

For all first-order factors, data were tabled according to whether the higher achiever in math, compared to the lower achiever within a matched pair, received a higher (H > L), lower (H < L) or approximately equal score (H = L). The students were not necessarily high or low achievers in comparison with their peers, only in comparison with their matched student.

Second-order factors were created by aggregating specific items from the data sources for the first-order factors. All items were drawn from the home interview, learning environment ratings, and teacher interview. Because the small sample size precluded the use of factor analytic techniques, individual items were grouped into the second-order factor by logical, not empirical, analysis. The attitude/modeling by significant others factor (see Appendix B) contained 25 individual items, the home-school cooperation factor (see Appendix C) contained 13 items, and the stress/chaos factor (see Appendix D) contained 17 items.

For each second-order factor, the status of higher and lower achieving students within pairs was compared on each individual item that comprised the factor. For each pair, the number of items in which the higher achiever scored higher, lower, or approximately equal was tallied. The total number of items in which the higher achiever scored higher, lower, or equal was computed across all pairs within each category.

Results

FIRST ORDER FACTORS

A .05 level of significance was adopted for all chi-square analyses of student demographics, home and family factors, and teacher stress. Using this criterion, 5 of 120 analyses were significant.

For the descriptive analyses, the number of pairs in which the higher acniever scored higher, lower, or equal to the lower achiever in a matched pair for cognitive, student cognitions, learning environment, motivation, and behavior ratings is shown in Table 3. For all descriptive analyses, results are always reported for what happens for the higher achieving student in the pair. All results are reported for matched pairs and do not indicate that the students are high or low achievers in relation to their peers.

Student Demographic Factors as an Explanation

No student demographic variable reached significance on the chi-square analyses. There were no relationships between grade, age, sex or race and student achievement.

Home and Family Factors as an Explanation

Of 24 home and family factors analyzed, only three reached significance in the chi-square analyses: (a) fathers' education level, X^2 (1, N = 25) = 5.00 p = .025, for the whole group combined (LD, EBD, EMR); (b) the amount of

Table 3

Comparison of Higher and Lower Achieving Matched Pairs on Each Factor by Category[a]

	LD			EBD			EMR			TOTAL		
Factor	H>L	H<L	H=L	H>L	H<L	H=L	H>L	H<L	H=L	H>L	H<L	H=L
Cognitive												
Verbal IQ	4	-	3	4	1	2	2	-	5	10	1	10
Performance IQ	4	-	3	3	1	3	3	-	4	10	1	10
Full scale IQ	2	-	5	3	1	3	2	-	5	7	1	13
Student Cognitions												
Poor listening	2	-	5	-	-	5	2	-	5	4	-	15
Positive listening	1	2	4	2	2	3	1	3	3	4	7	10
Cautious style	1	-	6	2	2	2	-	3	4	3	5	12
Active thinker	3	2	2	-	3	2	-	3	4	3	8	8
Understanding	1	1	4	2	1	2	-	1	6	3	3	12
Learning Environment												
Learning environment	-	-	7	-	2	5	-	2	5	-	4	17
Student Motivation												
Challenge	1	2	4	1	2	4	-	2	5	2	6	13
Curiosity	3	1	3	1	-	6	-	1	6	4	2	15
Mastery	3	2	2	1	3	3	2	1	4	6	6	9
Judgment	3	3	1	3	2	2	2	1	4	8	6	7
Criteria	2	1	4	-	2	5	2	4	1	4	7	10
Behavior Ratings												
Student rating of home behavior	2	2	3	1	2	4	1	3	3	4	7	10
Student rating of school behavior	2	2	3	1	1	5	1	4	2	4	7	10
Student rating of behavior with peers	2	2	3	2	4	1	1	2	4	5	8	8
Parent rating of home behavior	1	2	4	3	-	3	-	3	3	4	5	10
Regular teacher rating of school behavior	1	-	5	-	1	3	-	-	1	1	1	9
Special teacher rating of school behavior	1	-	4	2	1	3	1	2	4	4	3	11

[a]Entries denote number of pairs; number of pairs varies due to missing data. Columns indicate numbers within three groups.
H>L: higher achiever received higher score than lower achiever in pair
H<L: higher achiever received lower score than lower achiever in pair
H=L: scores were approximately equal for higher and lower achiever in pair

television viewing, X^2 (2, N = 13) = 7.63, p = .022, for the EBD group; and (c) the degree of structure provided for out of school time (p = .035 on Fisher's Exact Test) for the LD group. The degree of security provided the child at home also approached significance, X^2 (1, N = 40) = 3.60, p = .057, for the whole group analysis.

Teacher Stress Factors as an Explanation

The general level of stress reported by special education teachers in working with handicapped students was significant in the chi-square analyses for all groups combined, X^2 (2, N = 40) = 8.31, p = .016. In addition, the level of stress reported by special education teachers was significant for the EBD group, X^2 (2, N = 13) = 9.48, p = .009.

Cognitive Factors as an Explanation

The 15-point standard deviation of the WISC-R was used to describe a difference between matched pairs on the verbal, performance, and full scales. Within the LD and EMR categories, verbal performance, and full-scale IQ of the higher achieving student always was equal to or greater than those of the lower achiever (see Table 3). In no case did the higher achieving student receive a lower score on these subscales than did the lower achieving student. For the EBD group, most higher achieving students scored equal to or higher on each subscale than did the lower achieving students. However, for one EBD pair, on each subscale the higher achieving student scored lower than the lower achiever within the pair.

Student Cognitions Factor as an Explanation

Means for each student on each of the five subscales (poor listening, positive listening, cautious style, active thinker, and understanding) of the

Student Cognitions Questionnaire were compared to determine whether these student characteristics differentiated higher from lower achieving students within pairs. A directional difference on the four-point rating scale (positive ratings of 3 or 4 versus negative ratings of 1 or 2) between the higher and lower achieving student was considered to be a difference between students within each matched pair.

Poor listening. In both the EMR and LD groups, 5 out of 7 pairs were approximately equal in reported problems with listening, and in 2 pairs in each group, higher achieving students reported more problems with listening skills than did lower achieving students. For the EBD group, no differences were observed in any of the pairs in students' reports about their problems with listening.

Positive listening. For the LD group, 4 out of 7 pairs were equal. In 2 pairs, the higher achieving students received a lower score on positive listening skills and in one pair, the higher achieving student received a higher score on this subscale. For the EBD group, no differences were observed in 3 of 7 pairs in reported positive listening skills for higher and lower achieving students. In 2 pairs the higher achieving student scored higher and in 2 pairs scored lower than their matched counterparts. For the EMR group, no differences were observed in 3 out of 7 pairs. In 3 pairs, the higher achiever scored lower on positive listening, and in one pair, the higher achieving student scored higher than the lower achiever within the pair.

Cautious style. In the LD group, six out of seven pairs scored equally on measures of cautious style, and in one pair the higher achiever scored higher on cautious style than the lower achieving student. For the EBD group, no

consistent differences were observed between higher and lower achieving students. In the EMR group, four out of seven pairs showed no differences between higher and lower achieving students. In three pairs, the higher achieving students scored lower on cautious style than the lower achieving students.

Active thinking. In the LD group, in three of seven pairs the higher achieving student scored higher, in two pairs scored lower, and in two pairs scored equally with the lower achiever (on the active thinking scale). There were no differences in active thinking scores for four of seven pairs of EMR students, whereas in three pairs the higher achieving student scored lower on active thinking. For the EBD group, in three out of five pairs, the higher achieving student scored lower on active thinking and in two pairs no differences were observed.

Understanding. In four of six pairs of LD students, no differences were observed; in one pair the higher achiever scored lower in understanding and in one pair scored higher than the lower achieving student. For EBD students, two of the higher achievers scored higher, one scored lower, and one scored the same as the matched pair. For the EMR group, no differences were observed on measures of understanding between higher and lower achieving students except in one pair, in which the higher achiever scored lower than the lower achiever.

Student Motivation as an Explanation

The standard deviation of each of the five subscales was used as the criterion for describing a difference between pairs of students matched on academic engaged time. The standard deviations were: Challenge = .63, Curiosity = .77, Mastery = .62, Judgment = .45, and Criteria = .67. A higher score on a subscale indicated a more intrinsic orientation to classroom work.

Challenge. In the majority of pairs for all groups (4 of 7 in the EBD and LD groups, and 5 of 7 EMR pairs), no differences were observed between higher and lower achieving students in the extent to which challenging tasks were preferred. In two pairs within each of the handicapping conditions, the higher achieving students received lower scores on the challenge scale than the lower achievers. The higher achieving student scored higher on measures of preference for challenging tasks than the lower achiever in one pair for LD and EBD students.

Curiosity. In most of the pairs (6 of 7) in the EMR and EBD categories, no differences were observed between higher and lower achieving students on measures of curiosity. The only exception to this pattern was one EBD pair in which the higher achieving student scored higher than the lower achiever, and one EMR pair in which the higher achieving student scored lower on the curiosity measure than the lower achiever. For the LD group, a different pattern of results was noted. In six of seven pairs, the higher achieving student scores were equal to or significantly better than those of the lower achiever on measures of curiosity within the classroom. In one LD pair, the higher achieving student scored lower than the lower achieving student in the pair.

Mastery. No specific pattern emerged for any of the groups of students on the Mastery subscale. For the LD group, no differences were noted in two matched pairs; the higher achiever scored lower in two pairs, and the higher achiever scored higher on mastery items in three pairs. In the EBD group, 3 of 7 pairs scored equally, and 3 of 7 pairs showed the higher achieving student with lower scores on measures of mastery. In the EMR group, no differences in scores on mastery items were observed in 4 of 7 pairs. The higher achiever scored higher in 2 pairs and lower in 1 pair.

Judgment. Scores on the judgment scale showed a different pattern of results for the EMR compared to the LD and EBD groups. In 4 of 7 EMR pairs, no differences were observed between high and low achieving students on measures of judgment skills; in two pairs, the high achiever scored higher and in one pair the higher achiever scored lower than the low achiever. In both the LD and EBD groups, 3 of 7 pairs showed tne high achiever with higher scores on judgment; in 3 and 2 pairs respectively, the high achiever scored lower, and no differences were observed in the remaining pairs (1 LD, 2 EBD pairs).

Criteria. For the criteria scale, in most of the EMR pairs (4 of 7), the higher achieving student scored lower on measures of internal criteria for making judgments, whereas in most of the LD and EBD pairs, no differences between the high and low achieving students were noted.

Conditions in the Learning Environment

The learning environment conditions factor for each subject represents a mean rating of 13 statements that specify conditions characterizing the home, school, and community in which the child lives. Students within pairs were compared in terms of whether the summary rating of their learning environment was generally positive (3-4 rating) or negative (1-2 rating). In general, no differences were found in ratings of the learning environment for LD, EMR, or EBD students. The only exceptions were in the EBD and EMR groups wherein two pairs per group, the higher achieving student received a lower summary rating on the learning environment.

Behavior as an Explanation

The three point standard deviation of the Behavior Rating Profile was used as the criterion for determining a difference between higher and lower achievers within a pair.

Student ratings of behavior at home and school. Approximately equal numbers of higher achieving students reported greater, fewer and similar numbers of problem behaviors as did the lower achiever in the LD pairs. No differences were observed between higher and lower achieving students in reported problem behaviors for the majority of EBD pairs. There was a trend in the EMR group for the higher achieving student to report fewer problems at home and school than did lower achieving students.

Student ratings of problems with interpersonal relationships. Four of seven higher achieving students reported fewer interpersonal problems than did tneir lower achieving peer within the EBD pairs. For the LD group, the report of problems with interpersonal relationships by higher achieving students was similar to that of lower achievers. Likewise, no differences in reports of social problems were noted between higher and lower achievers in the majority of EMR matched pairs.

Parent rating of child's behavior. Parents of higher achieving EBD students rated their children's behavior as equally or more problematic than did parents of lower achievers. No differences were noted in the majority of parent ratings of problem behaviors for the LD pairs, and parents of higher achieving EMR students rated their children's behavior as equally or less problematic than did parents of lower achieving EMR students.

Regular teacher rating of child's behavior. No differences were observed in teacher ratings of problem behaviors between most of the higher and lower achieving matched EBD and LD students. Regular teacher data for the EMR group were not available, except for one pair in which no differences were observed.

Special education teacher ratings of child's behaviors. No differences were noted in special education teachers' ratings of students' problem behaviors for 4 of 7 EMR pairs and 4 of 5 LD pairs. The behavior of higher achieving EBD students was rated equally or more problematic than that of lower achieving students in 5 of 6 pairs by their special education teachers.

Considering all ratings by respondents, no apparent differences emerged in reports of problem behaviors in the EBD group, except that parents and special education teachers of the higher achieving students tended to rate their behaviors as more problematic than did the students themselves. For the LD group, ratings were consistent across respondents and did not discriminate between higher and lower achieving students. For the EMR group, ratings by students and parents indicated approximately equal or fewer problem behaviors in the higher achieving group of MR students.

SECOND ORDER FACTORS

The results for each pair by category are displayed in Table 4 for the three second-order factors: attitude/modeling by significant others, home-school cooperation, and stress/chaos. The results of the attitudes/modeling by significant others factor indicates that the attitudes toward education and modeling of achievement or intellectual behavior by significant adults in the child's environment were rated as comparable or more positive for the higher achieivng student on 86% of the items for the EBD group and on 91% of the items for the LD group. In contrast, for higher achieving EMR students, the ratings were comparble or more positive on only 73% of the factor items.

On the home-school cooperation factor, the degree of cooperation between home and school was rated as comparable or more positive for higher achieving

Table 4.

Comparison of Higher and Lower Achieving Matched Pairs on Three Composite Factors by Category

	Composite Factor											
	Attitudes/Modeling by Significant Others (25 items)				Home-School Cooperation (13 items)				Stress/Chaos (17 items)			
Category	H>L	L>H	H=L	Missing	H>L	L>H	H=L	Missing	H>L	L>H	H=L	Missing
EBD												
Pair #1	10	1	5	9	1	0	12	0	6	1	6	4
2	2	1	13	9	2	0	11	0	4	4	9	0
3	6	1	15	3	6	0	7	0	2	9	6	0
4	2	3	19	1	2	1	10	0	4	2	11	0
5	4	0	20	1	5	0	2	6	1	4	10	2
6	0	1	2	22	0	4	3	6	3	1	13	0
7	3	10	9	3	1	0	0	12	1	1	0	15
EBD Total	27 (21%)	17 (13%)	83 (65%)	48	17 (25%)	5 (7%)	45 (67%)	24	21 (21%)	22 (22%)	55 (56%)	21
LD												
Pair #1	1	2	17	5	0	0	12	1	7	2	8	0
2	3	1	21	0	2	1	10	0	7	3	7	0
3	7	2	15	1	6	0	7	0	4	4	8	1
4	8	1	14	2	4	2	7	0	1	3	13	0
5	4	3	16	2	0	0	13	0	2	1	14	0
6	1	2	19	3	0	0	12	1	3	0	12	2
7	2	2	18	3	2	1	10	0	2	4	9	2
LD Total	26 (14%)	13 (8%)	120 (75%)	16	14 (16%)	4 (4%)	71 (80%)	2	26 (23%)	17 (15%)	71 (62%)	5
EMR												
Pair #1	8	1	14	2	0	8	5	0	4	3	8	2
2	1	3	9	12	3	3	6	1	3	3	9	2
3	1	1	11	12	0	0	12	1	2	2	11	2
4	2	1	19	3	0	5	8	0	1	3	11	2
5	3	9	11	2	1	1	6	5	1	2	14	0
6	0	1	2	22	1	0	7	5	2	2	11	2
7	2	16	5	2	0	0	0	13	0	0	2	15
EMR Total	17 (14%)	32 (27%)	71 (59%)	55	5 (8%)	17 (26%)	44 (67%)	25	13 (14%)	15 (16%)	66 (70%)	25

H>L: indicates that the student with higher math achievement was rated more positively than the lower achieving student within the pair

L>H: indicates that the student with higher math achievement was rated more negatively than the lower achieving student within the pair

= indicates that both students were rated approximately equally

Missing: indicates number of items for which data was not available

* indicates total number of ratings

Percentages are based on total number of items rated less missing data

students on 92% of the items for the EBD group and on 96% of the items for the LD group. For the EMR group, home-school cooperation was rated as comparable or more positive on 75% of the factor items for the higher achiever.

The environments of higher achieving LD and EMR students were rated as comparable or less stressful on 85% and 84% of the items on the stress/chaos factor respectively. The ratings of the higher achieving EBD students were comparable or less stressful on 77% of the items characteristic of stress/chaos.

Discussion

The purpose of this study was to examine alternate explanations for math achievement differences in mildly handicapped students (LD, EBD, and EMR) for whom academic engagement rates are comparable. Eight explanations were examined in addition to three composite factors. Our results suggest that several variables, singly and in combination, may be plausible explanations for math achievement differences between independently matched pairs of students showing comparable amounts of academic engaged time, and that the salience of these factors as explanations for acheivement differences may vary according to the particular handicapping conditions (LD, EMR, EBD).

With regard to individual explanatory factors, no single factor was a consistent explanation across or within groups, with the exception of IQ. The performance of the higher achieving students on the WISC-R scales was equal to or significantly greater than that of the lower achiever within all categories of handicap. The single case in the EBD group on each subscale in which the higner achieving student scored lower than low achievers may represent cnaracteristics idiosyncratic to the particular students within the pair.

Cognitive ability as an explanation for math achievement differences for students with comparable amounts of engaged time was the only explanation in which a clear-cut pattern emerged. Although IQ is a strong predictor of achievement, substantial variance in achievement is accounted for by factors other than IQ (Bloom, 1976), and these factors are considered to be "alterable" (Bloom, 1980). Such factors as student attention (Karweit, 1983), academic learning time (Fisher & Berliner, 1985), and effectiveness of instruction (Rosenshine & Stevens, 1986; Ysseldyke, Christenson, & Thurlow, 1987) are considered "alterable" to some extent, and therefore have important implications for individual students, particularly those children who have measured lower intelligence. Carroll (1984) aptly reminds educators that proper use of time in school may result in increases in student aptitude (i.e., learning rate) and overall performance.

Although most of the explanations investigated did not provide a consistent explanation for math achievement differences for mildly handicapped students, regardless of categorical designation, several isolated interesting findings emerged. On the Harter scales, different patterns of results were observed for different categories of mildly handicapped students. Higher achieving EMR students appeared to use more external than internal criteria for making judgments about their classroom behavior. LD students were observed to be equally or more internally oriented with regard to curiosity and mastery motivation within the classroom, as compared to their lower achieving matched counterpart. Higher achieving EBD students appeared to be equally or more externally oriented with regard to mastery motivation within the classroom. Given these trends that suggest differences between different categories of

mildly handicapped students in their intrinsic and extrinsic orientations during academic activities, it may be a fruitful research endeavor to pursue the role of intrinsic versus extrinsic classroom orientation as an explanation for math achievement differences with a larger sample.

Behavior ratings by teachers did not discriminate higher from lower achieving students except in the EBD group, where teachers perceived the behavior of higher achieving students to be equally or more problematic than that of their lower achieving counterparts. Higher achieving EBD students reported fewer peer relationship problems than did lower achieving EBD students. In self-reports of behavior problems at home and at school, the only trend suggested by the data was that higher achieving EBD and EMR students reported equivalent or fewer problems than did lower achieving students. While parents of higher achieving EBD students rated their behavior as equally or more problematic than did parents of lower achieving EBD students, the trend was reversed for parents of LD and EMR students. That is, parents of higher achieving LD and EMR students rated their children's behavior as equally or less problematic than did parents of lower achieving LD and EMR students.

Teachers of higher achieving EBD students also perceived their behavior as equally or more problematic than that of lower achieving EBD students. One interpretation of these trends is that higher achieving EBD students may be more reactive to their environment generally than either LD or EMR students, and that the quality of their responsivity evokes negative attribution by parents and teachers of these students.

Comparison ratings on items comprising the three second-order factors of stress/chaos, home-school cooperation and attitude/modeling by significant

others suggests that the influence of these factors on students' math achievement may vary for different categories of mildly handicapped students. Home-school cooperation and the attitudes/modeling by significant others were more salient determinants of achievement for EBD and LD students than for EMR students in this matching study. In contrast, more variance in the ratings of degree of stress/chaos for EBD students was noted than for LD and EMR students, although the degree of stress did not discriminate higher from lower achieving EBD students.

In conclusion, creating composite variables was not helpful in explaining math achievement differences for the matched sample. Although these factors may have intuitive appeal as possible explanations for achievement differences, neither second-order factor by itself served as a consistent explanation for differences in math achievement for students matched on academic engaged time. It is difficult to draw definitive conclusions from these results given the small sample size or to predict what relationships would be observed with a larger sample size and more rigorous statistical procedures. The approach used in developing the composite factors was to examine the single influences of all the items categorized within a composite factor (e.g., stress/chaos). It may be that these items are interactive or summative in their effects. Future studies using parametric procedures with larger sample sizes may disclose more systematic relationships among these variables and student math achievement.

Several limitations of this study need to be noted. First, many statistical procedures, such as ANOVA, regression, or factor analysis, were inappropriate due to the small sample size. The descriptive approach, while intensive in terms of the number and thoroughness of the explanations examined,

makes it difficult to draw definitive conclusions. Second, chi-square analyses were used to examine the relationship of student demographic, home and family, and teacher stress explanations with math achievement. Of 120 analyses conducted, 5 were significant at the .05 level. Given the small sample size and number of tests conducted, 5-6 significant results would be expected due to Type I error. Based on these limitations, it is not possible to make strong statements about these factors as explanations for differences in math achievement for handicapped students matched on academic engaged time. Third, academic engaged time data were collected the year previous to data collection for the explanations; it is unknown whether students' engaged time data was stable across the two years.

In general, with the exception of the cognitive explanation, the results from the descriptive study do not indicate a clear-cut pattern of factors important for math achievement for the three handicap groups. Rather, factors vary for individual students, even for students within the same handicapping condition.

This study suggests the need for diagnosticians to engage in problem solving for individual children rather than labeling children as LD, EBD, or EMR. The study also suggests a need to broaden assessment from looking at internal student characteristics as the sole explanation for math achievement toward looking at the interaction of student characteristics with instructional, home and teacher characteristics. It is our belief that many factors contribute simultaneously to student achievement and have a synergistic effect on student performance. It also is our belief that the factors vary for individual students within the same categorical designation. There is a need to

investigate the interactive relationships among many factors influencing student achievement and daily student performance and success in school. These factors are important for assessment and planning of interventions for individual students. Our efforts need to facilitate the acquisition and application of mathematics skills for both handicapped and nonhandicapped students, as a proactive and reactive response to the serious math achievement problems in American schools.

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Appendix A

Conditions in the Learning Environment Scale

Instructions

Rate the extent to which the following are characteristic of the student's learning environment. Select one of 4 ratings: 4 means the statement is very much like the student's learning environment; 3 means the statement is somewhat like the student's learning environment; 2 means the statement is not much like the student's learning environment; and 1 means the statement is not at all like the student's learning environment. Circle only one rating.

1.	The home is supportive of school efforts.	4	3	2	1
2.	The community is supportive of school efforts.	4	3	2	1
3.	The student appreciates the value of hard work and education.	4	3	2	1
4.	High moral standards and values are fostered in the home.	4	3	2	1
5.	Members of the home help the child with schoolwork.	4	3	2	1
6.	Strong administrative leadership exists in the school.	4	3	2	1
7.	A rationale for working hard in school has been provided.	4	3	2	1
8.	The teaching style is task-oriented and humanistic.	4	3	2	1
9.	There is a strong belief that the school makes a difference for its students.	4	3	2	1
10.	The student's attitude toward school and learning is positive.	4	3	2	1

Appendix B

Attitude/Modeling by Significant Others Factor

Individual items:

Home interview:

1. Parent ratings of quality of math instruction in child's school.
2. Parent ratings of quality of reading instruction in child's school.
3. Number of hours/week parent reads at home.
4. Amount of schooling mother wants for her child.
5. Amount of schooling mother expects child to attain.
6. Mother's education level.
7. Father's education level.
8. Mother's level of satisfaction with the school.
9. Rating: "There is enough homework."
10. Rating: "There is enough discipline."
11. Rating: "Too much time is spent on art, music and drama."
12. Rating: "Too much time is spent on special help for children with problems."
13. Rating: "The school is generally well run."
14. Rating: "Not enough money is spent on education."
15. Rating: "How well do you expect your child to do in school this year?"

Interviewer's Summary Rating After Home Interview:

16. There is an emphasis on the value of education within the home.
17. Parents hold high, but reasonable expectations for their child's educational and employment possibilities.
18. The physical environment of the home exhibits some order and organization conducive to the development of organizational skills relevant in the school environment.

Appendix B

Attitude/Modeling by Significant Others - (continued)

Learning Environment Conditions:

19. Rating from home interview: High moral standards and values are fostered in the home.

20. Rating from student interview: A rationale for working hard in school has been provided.

21. Rating from home interview: A rationale for working hard in school has been provided.

22. Rating from interview with regular education teacher: A rationale for working hard in school has been provided.

23. Rating from interview with special education teacher: A rationale for working hard in school has been provided.

24. Rating from interview with regular education teacher. There is a strong belief that the school makes a difference for its children.

25. Rating from interview with special education teacher: There is a strong belief that the school makes a difference for its children.

Appendix C

Home-School Cooperation Factor

Individual items:

Home interview:

1. "Teachers are very friendly."
2. "Teachers seem to treat all children fairly."
3. "Teachers seem interested in _____'s education."
4. "Teachers give the impression that they want to keep parents out of school."
5. "I get enough information from the school about how _____ is doing."
6. "Do you know what _____ is learning (or has just finished doing) in reading, language or math?
7. "When do you talk with the people at _____'s school?"
8. "Did you discuss the last report card with _____?"

Interviewer's Summary Ratings after home interview:

9. There is practical support available for academic progress.
10. The parents are supportive of the child's school.

Learning Environment Conditions

11. Rating from home interview: The home is supportive of school efforts.
12. Rating from home interview: Members of the home help the child with school work.

Teacher Interview

13. "We are interested in whether you believe your efforts are supported by _____'s family. Describe their involvement with his/her school work or school life."

Appendix D

Stress/Chaos Factor

Individual items:

Home interview:

1. Adults that the child lives with.
2. Number of schools the child has attended.
3. Number of moves the child has made in his/her life.
4. Whether the child has lived with another family.
5. Whether the child has ever suffered serious illness.
6. Whether family members have suffered serious illness.
7. Deaths in the family.
8. Whether separation/divorce/marriage occurred within the family.
9. Other stresses in the family's life.

Teacher Interview:

10. Regular education teachers' rating of general stress in teaching.
11. Regular education teachers' rating of stress in teaching handicapped students.
12. Special education teacher's rating of general stress in teaching.
13. Special education teacher's rating of stress in teaching handicapped students.

Interviewer's Summary Ratings after home interview:

14. There is a predicatability and a basic routine to daily and weekly life.
15. The child's life ~~is~~/has not been a stressful one.
16. The family provides a secure environment for the child.
17. Direction or structure is provided by the parent for out-of-school time.

IAP PUBLICATIONS

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350 Elliott Hall
University of Minnesota
75 East River Road
Minneapolis, MN 55455

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No. 2 Instructional tasks used by mentally retarded, learning disabled, emotionally disturbed, and nonhandicapped elementary students by J. E. Ysseldyke, S. L. Christenson, M. L. Thurlow, & D. Bakewell (June, 1987).

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